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Sixty-First Annual Report of the Visitors of the University Observatory for 1935.

BOARD OF VISITORS, 1936.

THE VICE-CHANCELLOR (A. D. Lindsay, M.A., Master of Balliol).
THE SENIOR PROCTOR (W. C. Costin, M.A., St. John's).
THE JUNIOR PROCTOR (E. J. Bowen, M.A., University).
F. J. LYS, M.A., Hon. D.C.L., Provost of Worcester, Pro-Vice-Chancellor (*Chairman*).
THE ASTRONOMER ROYAL (H. Spencer Jones, M.A., D.Sc., F.R.S.).
THE DIRECTOR OF THE CAMBRIDGE OBSERVATORY (Sir A. S. Eddington, Hon. D.Sc., F.R.S.).
THE RADCLIFFE OBSERVER (H. Knox-Shaw, M.A., D.Sc., Trinity).

J. S. E. TOWNSEND, M.A., F.R.S., Fellow of New College. F. A. LINDEMANN, M.A., F.R.S., Fellow of Wadham and Student of Christ Church.	Until Oct., 1940.
E. A. MILNE, M.A., F.R.S., Fellow of Wadham. G. M. B. DOBSON, M.A., D.Sc., F.R.S., Lincoln, Reader in Meteorology.	Until Oct., 1945.

This report refers to the calendar year 1935.

I. Staff.

The permanent staff of the Observatory remains unchanged. Dr. H. Zanstra and Dr. S. Chandrasekhar worked at the Observatory during July and August. Graduate research in Astrophysics has been carried out by Messrs. J. D. Babbitt, I. A. Getting, T. L. Page, and Miss M. G. Adam.

II. Instruction.

Lectures on Solar Physics were given in the Hilary Term to four students, and on Stellar Astronomy in the Michaelmas Term to seven students by the Director. Dr. Fotheringham's class in Ancient Astronomy was attended by one student in the Hilary Term, and the class in Ancient Chronology by one student in both the Hilary and Michaelmas Terms. Three students attended Mr. Bellamy's class on Practical Astronomy in the Michaelmas Term. With the collaboration of Professor Milne a colloquium on Astrophysics was held weekly during the three terms, and five times during the Long Vacation. The Observatory was open regularly on Saturday evenings during the Hilary and Michaelmas Terms, and at other times by arrangement to various bodies. Over 200 persons have taken advantage of this opportunity to see through the 12-inch telescope.

III. Equipment.

The erection of the Solar Telescope was completed by Grubb, Parsons & Co. early in March. Adjustments and tests of its optical and mechanical performance were carried out during the spring and summer. The instrument gives excellent definition, and the 'seeing' in Oxford is sufficiently good for granulation generally to be visible. In the course of operation some difficulties with vibration and lost motion were encountered, but these defects have now been remedied by the makers.

The 30-foot spectroscope still lacks the essential temperature-control, the slit and plate-holder breech, and the optical bench with guiding disk. As far as can be told in its present incomplete form, the spectroscope gives the high resolving power and definition which had been anticipated from the use of the large glass prisms, and it is to be hoped that the £400 needed for its completion will be shortly forthcoming.

The new equipment was formally declared open by the Vice-Chancellor (Dr. F. J. Lys) on June 11 at a ceremony attended by many astronomers and members of the University. After inspecting the instruments the company attended a lecture by Sir Arthur Eddington on 'The Physics of the Sun'.

IV. Work.

Astrophysics. With the new Solar Telescope and a small spectrograph a series of calibrated spectra of solar granulation was obtained during September and October. These spectra and some earlier ones secured at Victoria have now been measured on the microphotometer. As a result of over 2,000 separate determinations of intensity the variation of surface-brightness due to granulation has been established to be of the order of 10 per cent. From a variety of considerations there seems little doubt that the granulation arises from vertical instability in a thin layer of the solar atmosphere, and a comparison with the work of Bénard, Rayleigh, and Jeffreys on vertical instability leads to a number of interesting conclusions on the physical conditions in this layer. An account of this investigation will shortly be communicated to the Royal Astronomical Society.

The observational work on the surface-brightness as a function of wave-length in the centre of the solar disk was continued through an exceptionally good summer, and finally completed. The heavy work of measurement and reduction will be put under way early in the present year. Preliminary observational work on the variation of surface-brightness across the disk was also carried out, but an additional summer's work will be needed to complete the observations.

With the exception of one or two minor points the spectrophotometric investigation of the continuous spectrum of the planetary nebulae has been completed by Mr. Page, and an account will shortly be presented to the Royal Astronomical Society. He has been able to show that the visual continuous spectrum (λλ 3,800–5,000) is produced by particles giving a non-selective scattering with an optical depth such that the nucleus appears some two magnitudes too faint. Further, he has established that the intensity distribution in the Balmer continuous spectrum is such as would result if the continuous absorption coefficient obeyed the Kramers-Gaunt frequency distribution, and the free electrons in the nebula had the Maxwellian velocity distribution corresponding to a temperature of 2,000° K.

Miss M. G. Adam has commenced a spectrophotometric study of the Swan bands in the solar spectrum. Dr. Babbitt continued his studies of absorption lines in stellar atmospheres and the relative abundance of hydrogen until his departure to fill a post in the National Research Laboratory, Ottawa. Dr. Getting made two long exposure spectra (200 hours each) of the night-sky spectrum without obtaining definite evidence of the interstellar calcium lines. Dr. R. V. Jones, the Skynner Senior Student of Balliol, has continued his work at the Clarendon Laboratory on the development of sensitive thermocouples and bolometers.

Astrographic Catalogue. Under the direction of Mr. F. A. Bellamy work on the Potsdam zones, +32° and +33°, has continued, as shown in the following table. The slower progress in measuring results from an increase in the number of stars per plate, the average number in 1933 being 475, in 1934, 337, and in 1935, 541. As in 1934, measurement was divided between Mr. Cook and Mr. Burnet, the latter engaged by Dr. Wilfred Hall to do this work for the Observatory. Measurement and reduction is 76 per cent. complete, observation 83 per cent.

Plates.	*Obtained.*		*Measured and Reduced.*	
	+32°	+33°	+32°	+33°
Before 1932 .	61	1	24	0
In 1932 .	14	3	34	0
In 1933 .	26	34	32	11
In 1934 .	79	124	48	57
In 1935 .	10	15	16	21

Reader in Ancient Astronomy. Dr. Fotheringham, who continues to act as Honorary Assistant, has published his study of the 'Mass of Venus and the Obliquity of the Ecliptic', and has also published a study of two Babylonian eclipses, one of the Sun, not hitherto discussed, and one of the Moon. These are the most precisely timed of all ancient eclipses, and give an excellent confirmation to the most recent determinations of the secular acceleration of the Moon's mean motion as referred to the Sun.

Seismology. Owing to the illness of Mr. J. S. Hughes, work on the International Seismological Summary has been seriously handicapped during the latter half of the year. However, the fourth quarter for 1930 and the first quarter for 1931 have been published and distributed, and the second quarter is ready for the press. A new metal globe for the preliminary determination of epicentres has been provided by a grant from the Gray-Milne Fund of the B.A. Seismological Committee, and the auxiliary apparatus for the globe by a generous gift from Mrs. Turner. A noteworthy feature of the year's work has been the publication by Miss Bellamy of a 'Catalogue of Earthquakes', essentially an index to the Summary for these years.

V. Publications.

The following papers have been published during the year, either as a result of work done at the Observatory, or by members of its staff:

E. F. BELLAMY. *Catalogue of Earthquakes 1925–1930* (British Association, 1935).

J. K. FOTHERINGHAM. 'The Mass of Venus and the Obliquity of the Ecliptic', *Astronomische Nachrichten*, Band 256, Nr. 6121.

'Two Babylonian Eclipses', *Monthly Notices*, R.A.S., vol. 95, p. 719.

J. S. HUGHES and E. F. BELLAMY. *The International Seismological Summary*, Part 4, 1930; Part 1, 1931.

H. H. PLASKETT. 'Astronomical Spectrophotometry', *Draft Reports of International Astronomical Union, 1935*.

H. ZANSTRA. 'Théorie de la lumière des nébuleuses.' Actualités scientifiques et industrielles (Hermann & Cie).

To the series 'Communications from the University Observatory, Oxford', Professor Milne has contributed No. 5 on 'Stellar Kinematics and the K effect'.

VI. Miscellaneous.

The following astronomers, among others, have visited the Observatory for periods of varying length during the year: Dr. W. S. Adams of Mt. Wilson, Dr. A. van Maanen of Mt. Wilson, Prof. S. A. Mitchell of Leander McCormick, Prof. H. F. Newall, Dr. J. S. Plaskett (The Halley Lecturer for 1935), Prof. H. N. Russell of Princeton, Dr. F. Schlesinger of Yale, and Prof. F. Slocum of Van Vleck.

In addition to the usual astronomical and seismological periodicals regularly received during the year, Professor Milne has very generously presented the 'Journal of Scientific Instruments' for the years 1934, 1935. To the Radcliffe Trustees the Observatory is indebted for a very fine portrait of Sir Henry Saville.

H. H. PLASKETT.

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